CLAIMS

1. An implantable device for semiautomatic suturing using a surgical thread (1_1), the suturing enabling biological and/or artificial tissues to be united, the device comprising blocking means (2) enabling two strands (3_1, 3_2) of the thread of a suture to be connected together in a blocking zone (4_2), and comprising a bearing element having a bearing surface (4_1) for bearing against the tissues to be sutured together, the device being characterized in that it further comprises controlled tensioning means (4_3) for applying controlled tensioning to said thread, and suitable for exerting a tension having a first predetermined tension value after the two strands of said thread have been blocked together using said blocking means (2), with the junction between said bearing element (4_1) and said blocking zone (4_2) of the device being provided by said controlled tensioning means (4_3).

2. A device according to claim 1, characterized in that the blocking of said strands of thread using said blocking means is suitable for automatically triggering said tensioning of the threads to a said predetermined tension value, preferably lying in the range 0.1 N to 10 N.

3. A suture device according to claim 1 or claim 2, characterized in that said controlled tensioning means (4_3) enable the distance between said blocking zone (4_2) and said contact zone (4_1) in contact with the tissue to be adjusted between:

· an initial distance (L) in which said two ends of the strands (3_1, 3_2) of thread can be blocked together with the thread being at a tension that is preferably low; and

· a final distance ($L' = L \pm b$) suitable for exerting a said controlled tension having a said first predetermined tension value.

4. A suture device according to claim 3, characterized in that said tensioning means (4_3) comprise resilient junction means between said contact zone (4_1) and said blocking zone (4_2) so as to enable the distance between said contact zone (4_1) and said blocking zone (4_2) to be adjusted between:

· a controlled initial distance (L) in which the spacing between said contact zone (4_1) and said blocking zone (4_2) is controlled by a first link element (5_1) and/or a first spacer element (5_2), and said initial distance (L) corresponding to a distance in which said blocking zone (4_2) and said contact zone (4_1) are in a close-together position by applying compression compared with a spaced-apart, rest position ($L + a$); and

· said final adjusted distance ($L' = L \pm b$) corresponds to a position of force equilibrium in which the distance between said contact zone (4_1) and said blocking zone (4_2) is no longer controlled by a said first link element (5_1) and/or a said first spacer element (5_2).

5. A device according to claim 4, characterized in that said initial distance (L) between said blocking zone (4_2) and said contact zone (4_1) can be obtained using a first link element (5_1) suitable for initially connecting said blocking zone (4_2) and said contact zone (4_1) of the device, and said final distance ($L' = L \pm b$) of said first blocking zone (4_2) relative to said first contact zone (4_1) can be implemented by releasing said first link element (5_1).

6. A device according to claim 5, characterized in that said first link element (5_1) is suitable for co-operating with said blocking means (2) in such a manner that said

first link element (5_1) is released once said strands of thread (3_1, 3_2) have been blocked together using said blocking means (2).

7. A suture device (1_1) according to claim 4, characterized in that said device (1_1) is suitable for co-operating with a placing instrument (1_2) to which it is secured, preferably via a top portion corresponding to said blocking zone (4_2) in such a manner that:

· prior to said bearing surface (4_1) coming into contact with said tissue, said resilient junction means (4_3) are at rest, and said bearing surface (4_1) and said A blocking zone (4_2) are in a spaced-apart position;

· when said contact zone (4_1) is pressed against said tissue for suturing, said resilient junction means (4_3) are put into compression and the distance between said contact zone (4_1) and said blocking zone (4_2) decreases to a said initial distance (L) controlled by a said first minimum spacer element (5_2), which element is preferably secured to said instrument (1_2), said bearing surface (4_1) coming into abutment against said first spacer element (5_2) of said instrument; and

· said final distance (L') is obtained by co-operation between said placing instrument (1_2) and said device (1_1), preferably by separating said placing instrument (1_2) from said suture device (1_1).

8. A device according to any one of claims 2 to 7, characterized in that it is adapted for the thread to be disengaged so as to be capable of being cut between said blocking zone (4_2) and said suture orifices (6_1, 6_2) in said tissue, preferably between said blocking zone (4_2) and said contact zone (4_1).

9. A device according to any one of claims 1 to 8, characterized in that it includes guide means (7) enabling the two strands (3_1, 3_2) of thread to be held

laterally spaced apart from each other at the suture orifices (6_1, 6_2) in said tissue.

10. A device according to claim 9, characterized in that said guide means (7_1, 7_2) comprise at least one notch (7_1) made in said bearing surface defining said contact zone (4_1).

11. A device according to claim 10, characterized in that said guide means comprise, on an under-face of a said notch (7_1), a piece of fabric (7_2) of biocompatible material suitable for being pierced by said two strands of thread in order to keep them spaced apart.

12. A device according to any one of claims 4 to 11, characterized in that it is U-shaped, comprising:

· a bottom first branch (4_1) defining a said bearing surface for bearing against said tissue, and including said contact zone (4_1);

· a top second branch (4_2) including said blocking zone and secured with or co-operating with said blocking means (2); and

· a junction element (4_3) between said first and second branches (4_1, 4_2), the junction element being made of a semirigid material presenting a said elasticity, preferably being a curved junction element (4_3) providing a hairpin junction between said first and second branches.

13. A device according to any one of claims 4 to 11, characterized in that it is constituted by:

· a first plate (4_1) defining a said bearing surface for bearing on said tissue, and including said contact zone;

· a second plate (4_2) including said blocking zone; and

· said first and second plates (4_1, 4_2) being connected together by a junction element (4_3) comprising a resilient spring wire or spring blade.

14. A device according to claim 13, characterized in that:

· said spring wire (4_3) defines a frustoconical envelope;

· said first plate (4_1) is placed at the end of said spring beside the large base of said truncated cone formed by said spring;

· said second plate (4_2) is placed at the end of said spring that is beside the small base of said truncated cone formed by said spring; and

· preferably, said spring (4_3) is suitable for being received in its own empty central space when it is compressed by moving said first and second plates towards each other.

15. A device according to any one of claims 1 to 14, characterized in that said blocking means (2) comprise two blocking surfaces (2_1, 2_2) capable of moving between a spaced-apart position in which it is possible to insert said strands (3_1, 3_2) of thread between said two blocking surfaces (2_1, 2_2), and suitable for blocking said strands (3_1, 3_2) of thread together by friction between the threads and said two blocking surfaces (2_1, 2_2) once the surfaces are in a close-together, blocking position, the displacement of said two surfaces between said spaced-apart position and said close-together position automatically triggering said tensioning of the threads after blocking.

16. A device according to claim 15, characterized in that said blocking of the strands of thread using said blocking means is suitable for being triggered automatically.

17. A device according to claim 16, characterized in that the automatic triggering of the blocking of said strands of thread using said blocking means take place when the device is pressed into contact with the tissues to be sutured together with a bearing force that is greater than a second predetermined value, preferably lying in the range 0.2 N to 20 N, and more preferably greater than 10 N.

18. A device according to any one of claims 15 to 17, characterized in that said blocking means comprise two jaws (2) resiliently connected together and forming respective ones of said blocking surfaces (2_1, 2_2) which are held apart by a second spacer element (2_3), said second spacer element (2_3) being suitable for being released by being disengaged or broken so as to enable said blocking surfaces (2_1, 2_2) to move towards each other and block said strands (3_1, 3_2) of thread together.

19. A device according to claim 18, characterized in that said second spacer element (2_3) is suitable for being released automatically, preferably by pressing said placing instrument (1_2) against said second spacer element (2_3) while said bearing surface (4_1) of the device is exerting pressure on the tissues that is greater than a second determined value, preferably lying in the range 0.2 N to 20 N, and more preferably not less than 10 N.

20. A device according to any one of claims 17 to 19, characterized in that said second spacer element (2_3) is suitable for being released by automatically triggering release of said first link element (5_1) between said blocking zone (4_2) and said contact zone (4_1) of the device so that said zones adopt a said final distance ($L' = L \pm b$) that is adjusted to allow a said first

controlled tension value to be exerted on said strands of thread.

21. A device according to any one of claims 1 to 20, characterized in that said bearing element (4_1), said blocking means (2), and said controlled tensioning means (4_3) form a single one-piece mechanical part.

Translation of the title and the abstract as they were when originally filed by the Applicant. No account has been taken of any changes that may have been made subsequently by the PCT Authorities acting ex officio, e.g. under PCT Rules 37.2, 38.2, and/or 48.3.